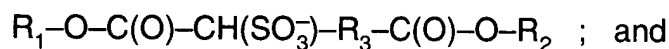
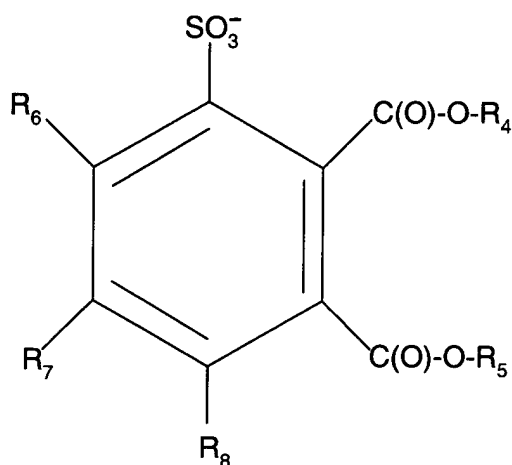


What Is Claimed Is:

1. An ionic liquid composition comprising:
 - (a) a cation having more than 4 carbon atoms; and
 - (b) an anion selected from the group consisting of



I



II

wherein R_1 , R_2 , R_4 and R_5 are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups;

wherein R_3 is a substituted or unsubstituted alkylene group, heteroarylene group, arylene group, or cycloalkylene group ;

wherein R_6 , R_7 , and R_8 are independently selected from H, alkyl, NO_2 , halo, cyano, silyl, and OH;

or R_1 and R_2 may be taken together to form a ring;

or R_4 and R_5 may be taken together to form a ring;

or R_6 and R_7 or R_7 and R_8 may be taken together to form a ring.

2. The composition of Claim 1 wherein the anion has the chemical structure I.
3. The composition of Claim 2 wherein R_1 and R_2 are independently selected from alkyl groups having about five or more carbon atoms.
4. The composition of Claim 2 wherein R_1 and R_2 are independently selected from alkyl groups having from about six to about eighteen carbon atoms.

- 1 5. The composition of Claim 2 wherein R_3 is $-(CH_2)_n-$ wherein n is an integer of from about
2 one to about 10.
- 3 6. The composition of Claim 5 wherein R_1 and R_2 are independently selected from alkyl
4 groups having from about six to about eighteen carbon atoms.
- 5 7. The composition of Claim 6 wherein n is one and R_1 and R_2 are
6 $-CH_2-CH(CH_2CH_3)(CH_5CH_2-CH_3)$.
- 7 8. The composition of Claim 1 wherein the anion has the chemical structure II.
- 8 9. The composition of Claim 8 wherein R_6 , R_7 , and R_8 are H.
- 9 10. The composition of Claim 8 wherein R_4 and R_5 are independently selected from alkyl
10 groups having about five or more carbon atoms.
- 11 11. The composition of Claim 8 wherein R_4 and R_5 are independently selected from alkyl
12 groups having from about six to about eighteen carbon atoms.
- 13 12. The composition of Claim 9 wherein R_4 and R_5 are independently selected from alkyl
14 groups having about five or more carbon atoms.
- 15 13. The composition of Claim 9 wherein R_4 and R_5 are $-CH_2-CH(CH_2CH_3)(CH_2-CH_2-CH_3)$.
- 16 14. The composition of Claim 2 further comprising a catalyst.
- 17 15. The composition of Claim 7 further comprising a catalyst.
- 18 16. The composition of Claim 2 further comprising a hydrocarbon.
- 19 17. The composition of Claim 7 further comprising a hydrocarbon.
- 20 18. The composition of Claim 8 further comprising a catalyst.
- 21 19. The composition of Claim 9 further comprising a catalyst.
- 22 20. The composition of Claim 8 further comprising a hydrocarbon.
- 23 21. The composition of Claim 9 further comprising a hydrocarbon.
- 24 22. The composition of Claim 1 wherein the cation is a quaternary ammonium or quaternary
25 phosphonium.
- 26 23. The composition of Claim 22 wherein the quaternary ammonium cation is independently
27 selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium,
28 pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium,
29 imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and
30 thiophenium.

24. The composition of Claim 1 wherein the cation is an ammonium cation substituted by one or more groups selected from the group consisting of alkyl and aryl groups.

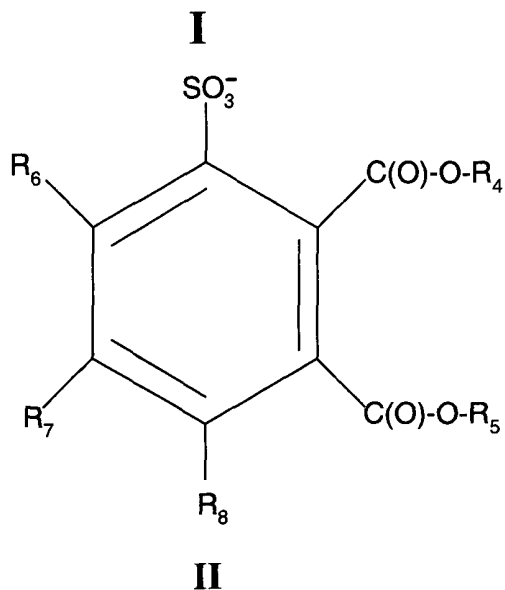
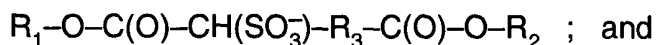
25. The composition of Claim 22 wherein the quaternary ammonium cation is BMIM.

26. The composition of Claim 1 wherein the cation is tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N – dialkyl pyrrolidinium, trimethyl 2-hydroxyethyl ammonium, N, N' – dialkyl imidazolium, N-alkylpyridinium, or a mixture thereof.

27. An ionic liquid composition comprising at least about 55 weight percent of an ionic liquid comprising:

(a) a cation; and

(b) an anion selected from the group consisting of



wherein R_1 , R_2 , R_4 and R_5 are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups;

wherein R_3 is a substituted or unsubstituted alkylene group, heteroarylene group, arylene group, or cycloalkylene group ;

wherein R_6 , R_7 , and R_8 are independently selected from H, alkyl, alkoxy, alkylthio, SO_3H , NO_2 , halo, cyano, silyl, and OH;

or R_1 and R_2 may be taken together to form a ring;

1 or R₄ and R₅ may be taken together to form a ring;

2 or R₆ and R₇ or R₇ and R₈ may be taken together to form a ring.

3 28. The composition of Claim 27 wherein the ionic liquid is hydrophobic.

4 29. The composition of Claim 28 wherein the cation is a quaternary ammonium or quaternary
5 phosphonium.

6 30. The composition of Claim 29 wherein the quaternary ammonium cation is independently
7 selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium,
8 pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium,
9 imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and
10 thiophenium.

11 31. The composition of Claim 30 wherein the cation is an ammonium cation substituted by
12 one or more groups selected from the group consisting of alkyl and aryl groups.

13 32. The composition of Claim 30 wherein the quaternary ammonium cation is BMIM.

14 33. The composition of Claim wherein the cation is tetrabutyl ammonium, tributylmethyl
15 ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N – dialkyl pyrrolidinium,
16 trimethyl 2-hydroxyethyl ammonium, N, N' – dialkyl imidazolium, N-alkylpyridinium, or a
17 mixture thereof.

18 34. The composition of Claim 27 wherein the anion is Docusate.

19 35. The composition of Claim 27 wherein the anion has the chemical structure I and is
20 hydrophobic.

21 36. The composition of Claim 27 wherein the anion has the chemical structure II and is
22 hydrophobic.

23 37. The composition of Claim 27 wherein the anion has the chemical structure I and is
24 hydrophilic.

25 38. The composition of Claim 27 wherein the anion has the chemical structure II and is
26 hydrophilic.

27 39. The composition of Claim 1 wherein the ionic liquid is hydrophobic.

28 40. The composition of Claim 1 wherein the ionic liquid is hydrophilic.

29 41. The composition of Claim 1 wherein the anion is selected from the group consisting of
30 the anions of (i) di-n-cyclohexyl ester of sulfosuccinic acid; (ii) di-n-octyl ester of sulfosuccinic
31 acid; (iii) di-n-butyl ester of sulfosuccinic acid; (iv) di-isobutyl ester of sulfosuccinic acid; (v) di-

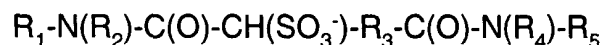
neopentyl ester of sulfosuccinic acid; (vi) di-n-heptyl ester of sulfosuccinic acid; and (vii) di-n-heptyl ester of sulfosuccinic acid.

42. The composition of Claim 41 wherein the cation is tetrabutyl ammonium.

43. An ionic liquid composition, comprising:

(a) an onium cation; and

(b) an anion having the following structure:



III

wherein R_1 , R_2 , R_3 , R_4 , and R_5 are independently selected from the group consisting of a hydrogen atom and a carbon-containing group;

and wherein the ionic liquid has a melting point that is less than about 100°C.

44. The composition of Claim 43, wherein R_1 is 2-ethylhexyl, R_2 is ethyl, R_3 is a methylene group, R_4 is ethyl, and R_5 is 2-ethylhexyl.

45. The composition of Claim 44, wherein the cation is tetrabutyl ammonium.

46. The composition of Claim 44, wherein the cation is 1-methyl-3-hexyl imidazolium.

47. The composition of Claim 43, wherein R_1 is 2-ethylhexyl, R_2 is a hydrogen atom, R_3 is a methylene group, R_4 is a hydrogen atom, and R_5 is 2-ethylhexyl.

48. The composition of Claim 47, wherein the cation is tetrabutyl ammonium.

49. The composition of Claim 47, wherein the cation is 1-methyl-3-hexyl imidazolium.

50. The composition of claim 43, further comprising a hydrocarbon.

51. The composition of claim 1, wherein the cation and the anion form a molten salt having a melting point of less than about 100°C, the molten salt being selected from the group consisting of tetrabutylammonium docusate, MeBu₃N docusate, Me₃N(CH₂)₆NMe₃ docusate, Bu₄P docusate, Et₄N docusate, 1-hexyl-3-methyl imidazolium docusate, 1-octyl-3-methyl imidazolium bromide docusate, 1-butyl-3-methyl imidazolium docusate, and 1-methyl-2-ethyl imidazolium docusate.

52. A composition comprising:

(a) an ionic liquid containing an anion that is selected from the group consisting of (i) docusate,

(ii) an anion of a bis(organo)ester derivative of sulfosuccinic acid, and (iii) an anion of a bis(organoamide) derivative of sulfosuccinic acid; and

(b) CO₂ at supercritical conditions;

- 1 wherein the ionic liquid is dissolved in the CO₂.
- 2 53. A composition comprising:
- 3 (a) a hydrocarbon fuel; and
- 4 (b) an ionic liquid containing an anion that is selected from the group consisting of (i) docusate,
- 5 (ii) an anion of a bis(organo)ester derivative of sulfosuccinic acid, and (iii) an anion of a
- 6 bis(organoamide) derivative of sulfosuccinic acid.
- 7 54. A composition comprising:
- 8 (a) a polymer; and
- 9 (b) an anti-static additive comprising an ionic liquid containing an anion that is selected from the
- 10 group consisting of (i) docusate, (ii) an anion of a bis(organo)ester derivative of sulfosuccinic
- 11 acid, and (iii) an anion of a bis(organoamide) derivative of sulfosuccinic acid.
- 12 55. The composition of claim 54, wherein the polymer is polyvinylacetate.
- 13 56. An ionic liquid composition, comprising:
- 14 (a) an onium cation having more than 4 carbon atoms; and
- 15 (b) an anion selected from the group consisting of Docusate and a docusate variant.
- 16 57. The ionic liquid composition of claim 56 wherein the ionic liquid melts at a temperature
- 17 range that is greater than about 40° C but less than about 80° C.
- 18 58. A composition, comprising:
- 19 a first ionic liquid combined with a second ionic liquid,
- 20 (a) the first ionic liquid comprising:
- 21 (i) a cation selected from the group consisting of ammonium, sulfonium, and
- 22 phosphonium cations, said cation being non-tetrahedrally symmetric;
- 23 (ii) an anion having the formula Al_yR_{3y+1} wherein y is greater than 0 and R is
- 24 independently selected from the group consisting of an alkyl group and halogen
- 25 group;
- 26 (b) the second ionic liquid comprising an anion that is selected from the group
- 27 consisting of (i) docusate, (ii) an anion of a bis(organo)ester derivative of
- 28 sulfosuccinic acid, and (iii) an anion of a bis(organoamide) derivative of
- 29 sulfosuccinic acid.
- 30 59. The composition of claim 58, further comprising reactants, the first and second ionic
- 31 liquids being an effective reaction solvent for the reactants.